

GENERAL SPECIFICATIONS FOR MACHINERY

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BUREAU OF SHIPS, NAVY DEPARTMENT

SECTION A1 - GENERAL REQUIREMENTS

1 February 1941

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(Superseding Section A1, General Requirements, dated 1 June 1940)

A1-a. General features.

1. These General Specifications for Machinery have been prepared by the Bureau of Ships, Navy Department for private shipyards and Navy yards building vessels for the United States Navy and inspectors, contractors, manufacturers, and others interested in the supply of machinery for the vessels of the United States Navy. They are the basis of all special specifications, form part of all machinery contracts, and the practice set forth therein shall govern in all cases unless modified or excepted by the special specifications issued in each individual case.

2. The machinery covered has been grouped under separate subsections and each subsection designated by general file group symbol, as per index. Each subsection is supplied in pamphlet form and may be obtained upon application to the Bureau of Ships.

A1-b. Special specifications.

1. Special Specifications for Propelling Machinery are issued for each contract and note all exceptions, additions, or modifications of these General Specifications for Machinery which are to govern and also all subsections of same which are to apply without change.

2. Navy Department specifications for Naval supplies, equipment and materials are issued by the Bureau of Supplies and Accounts, Navy Department. These specifications cover in detail materials referred to herein. Wherever practicable these General Specifications for Machinery include, as a reference in the case of any material, the designating number of the Navy Department specification which applies.

3. As these General Specifications for Machinery and Navy Department specifications must necessarily be revised from time to time, it should be clearly understood that those specifications in effect on date of invitation for bids shall in all cases govern unless modification is later agreed to by both the contracting parties.

Al-c. Basic requirements.

1. An obvious purpose of these General Specifications for Machinery is to secure as far as possible uniformity of practice and quality of materials and workmanship throughout the vessels of the United States Navy. Less obviously it is the purpose to incorporate herein the results of experience in regard to the special requirements of Naval design to the end that all interested may the more fully cooperate in the production of efficient fighting vessels.

2. It is clear that Naval requirements cannot always be exactly specified in an absolute sense. Certain basic considerations have governed the preparation of these specifications, however, and it appears desirable to set them down for the information of all concerned.

3. All the usual desirable characteristics of commercial machinery are equally important from the Naval point of view. Some of these, however, are of exceptional importance in Naval practice. Certain additional characteristics which commercial service does not ordinarily require are extremely important on Naval vessels.

4. The primary requirements which are the basis for the selection of all Naval equipment follow:

- (a) Maximum reliability.
- (b) Minimum space and weight.
- (c) Maximum accessibility for inspection, maintenance, and repair.
- (d) Maximum resistance to corrosive action, in particular that of moist sea air.
- (e) Maximum operating and maintenance economy.
- (f) Satisfactory operation when inclined as follows:

(1) Up to 5 degrees (on submarines 7 degrees for machinery for surface operation, 15 degrees for machinery for submerged operation) from the normal horizontal position in the fore and aft plane (permanently inclined).

(2) Up to 15 degrees to either side (permanently inclined).

(3) With the vessel rolling up to 45 degrees from the vertical to either side.

(4) With the vessel pitching 10 degrees up and down from the normal horizontal plane.

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In this connection all rotating machinery shall be installed with the axis of rotation parallel to the keel of the ship, except where otherwise specifically approved by the bureau concerned.

- (g) Satisfactory operation under the large uneven stresses induced by the laboring of a vessel in a seaway and the variable propeller load.
- (h) Satisfactory operation under vibrations of the mounting at fairly high frequencies.
- (i) Satisfactory operation under very heavy shock to mounting and structure.
- (j) Maximum interchangeability of parts.
- (k) Minimum number of necessary spare parts together with the best facilities for stowage and handling same when furnished
- (l) Satisfactory identification of all equipment and parts for ease in accurate requisitioning from distant parts of the world.
- (m) Satisfactory plans and drawings with full and concise manufacturing and operating instructions.
- (n) Readily susceptible to repair by Naval personnel, and with the facilities ordinarily to be found on board vessels of the Navy.

5. The mass-elastic system of each propelling unit, consisting of propeller, shafting, gears, and turbines, shall be calculated for torsional vibration and these calculations shall be submitted for the Bureau's approval. Unless specifically waived, the Bureau will require that the natural frequency of the two or more turbine branches, assuming a node at the bull gear, be made alike. The contractor will obtain a decision from the Bureau in the case of each new design.

Al-d. Bureau approval.

1. Normally, specific Bureau approval of design, materials, and workmanship proposed for use in a given equipment on contract is obtained by the submission via the Bureau's inspector of type B drawings, this action being required prior to commencing work, see Subsection Sl-1. Such approval is given in writing by the Bureau or the Bureau's authorized agent by endorsement of plans or purchase orders.

2. Regarding certain features which cannot be definitely specified, the expressions "satisfactory to the Bureau", "suitable for the purpose", "unless otherwise approved", "in an approved manner", or similar expressions may be used. Where such wording is used, it shall be interpreted to mean that specified approval will be required according to the procedure given in paragraph 1, above.

3. In the development of design, if a contractor considers it necessary or desirable to change, depart from, or modify the requirements of controlling specifications and/or plans he shall consult with the Supervisor of Shipbuilding, or the Inspector of Machinery concerning such departures or modifications and after consultation, if still considered desirable, the matter shall be referred to the Bureau for decision. To avoid delay it is essential that this be done, if possible, prior to the completion and submission of type B plans. Where submitted to the Bureau for decision, the reason for such changes, modifications and/or departures from the specifications shall be clearly stated in the contractor's letter and the Supervisor of Shipbuilding or the Inspector of Machinery shall comment fully thereon in his letter of transmittal to the Bureau. This procedure is important and it is essential that it be followed strictly to avoid delay.

4. Approval of plans of machinery and equipment for Naval use is, in all cases, secondary to satisfactory operation under service conditions; by approval of plans the Bureau thereby assumes the responsibility to the Government for the purchase of the material represented but in no way assumes any part of the contractor's responsibility as to the design or the satisfactory performance thereof for the purpose intended. If for any reason an apparatus fails to meet service requirements, although its use has been tentatively sanctioned by Bureau approval of plans, such fact does not relieve the contractor from the responsibility to correct defects and make such changes as may be necessary to meet the service requirements, without additional cost to the Government. When plans have been approved by the Bureau subject to specific modifications and the contractor has no objections to such modifications, the contractor may proceed with the work in accordance with the plans as modified on the assumption that revised plans may be submitted in due course for file and to record the fact that the specified modifications have actually been made in the plans and followed in the work.

5. Type approval.

(a) When items of equipment are specified to be of "approved type", "approved design", etc., this shall be interpreted to mean that the item in question is not fully susceptible to treatment in specifications for competitive bidding, and that such items must have been tested and found satisfactory for Naval use (for special classes of equipment in this category, see Subsection Sl-2). In these cases, "type approval", based on test performance must have been given prior to opening of bids, except in cases where there will be ample time to complete "type approval" tests subsequent to opening of bids and prior to award of contract. This exception applies only when specifically noted in detail on requisitions, schedules, and contracts or orders when authorized by the Bureau.

(b) "Type approval" (i.e., inclusion in the Navy Department Acceptable List) may be obtained either by special Government laboratory tests (conducted at the expense of exhibitor) authorized by the Bureau, tests in the Naval service under the cognizance of the Bureau, or of both, as may be required in each case. As reliability in service operation will be the primary factor in the selection of designs for type approval, the Bureau reserves the right to remove any item of equipment from such list of approved types upon evidence of lack of operating reliability in service.

(c) The fact that an item of equipment has "type approval" status as to design does not relieve the contractor of the necessity for submitting detail plans or approval of material and workmanship unless this is so stated in the specifications.

(d) Information relative to equipment which has received "type approval" will be furnished shipbuilders and primary contractors for assembled units by the Bureau's inspector when requested, or this information may be obtained by direct application to the Bureau.

Al-e. Completeness of machinery.

1. It is the intent of the machinery specifications of a vessel to obtain machinery and equipment complete in every way ready for operation and service, unless specific exception is made stating that certain parts are to be supplied by the Government or from other sources.

Al-f. Interchangeability.

1. Sister ships, and where practicable, all vessels of the same class shall have the same general arrangement of fittings, piping, and wiring, and, where the type of propelling machinery permits, the same general arrangement of auxiliary machinery. In particular, all power, lighting, interior-communication, and fire-control circuits and equipment should be similarly arranged. Where the type of propelling machinery of sister vessels permits, the auxiliary machinery of such vessels shall be identical. Oil-burning equipment, shafting, and propellers shall also be identical; the shaft tapers and propeller hubs shall all be machined to the same template. On individual ships interchangeability shall be carried out to the greatest possible extent, particularly between the main engines, and between the various mechanical and electrical auxiliaries. Supervisors of Shipbuilding, Inspectors of Machinery and the contractors must cooperate to the extent necessary to achieve this result.

Al-g. Omissions, mistakes, and discrepancies.

1. The inadvertent displacement, inclusion, or omission of any word, letter, or punctuation mark shall in no way be considered to alter the manifest "true spirit, intent, or meaning" of any general, special, or detail material specification for machinery.

2. Any part of machinery, or any essential article pertaining to the operation thereof, specific mention of which has been inadvertently omitted from the contract, specifications, or drawings, pertaining thereto, but which is necessary for the proper completion and performance thereof, shall be supplied in the same manner as though it had been properly specified in contract specifications or drawings. The same applies to details omitted intentionally for the sake of clarity or convenience.

3. Mistakes in the descriptions of machinery details or work items, failure to correct which would interfere with proper performance of the machinery involved, shall not release the contractors from the responsibility for producing satisfactory results or for properly performing the work indicated in the same manner as though it had been fully and correctly specified. Further, such mistakes shall be corrected without additional expense to the Government or change in the contract price.

4. Should any discrepancy be found to exist in the specifications, or should the language of any part thereof prove to be ambiguous or doubtful, the Supervisor of Shipbuilding or the Inspector of Machinery shall decide as to the true spirit, intent, or meaning, basing his decision on the best Naval practice on the date of award of contract. If such decision should not be acceptable to the contractor, a final decision shall be made by the Bureau. All such decisions shall be communicated to the contractor in writing and a copy forwarded to the Bureau.

Al-h. Trial equipment.

1. All fittings, instruments, attachments, and connections of whatever nature necessary for, or ordinarily used during an official trial, shall be supplied by the contractor as a part of the trial equipment, whether included in these specifications or not. Such instruments owned by the Government, as the Board of Inspection and Survey may require, will be installed and removed at the expense of the contractor. A list of all temporary trial equipment, together with a separate list of any special equipment which has been voluntarily furnished by the contractor, shall be given to the Supervisor of Shipbuilding or Inspector of Machinery prior to the trials of the vessel. After the completion of the trials the temporary trial equipment shall be removed from the vessel by, and remain the property of the contractor.

(a) The machinery contractor shall calibrate permanently installed instruments and gages supplied by the machinery contractors, to the satisfaction of the Naval Inspector.

(b) The building yard shall calibrate permanently installed instruments and gages supplied by the ship contractor, together with Government supplied instruments to be used for trial purposes only, to the satisfaction of the Naval Inspector.